

Applic. No. 10/623,068

Amdt. dated March 31, 2005

Reply to Office action of January 6, 2005

Remarks/Arguments:

Reconsideration of the application is requested.

Claims 1-29 and 32-34 remain in the application. Claims 1 and 22 have been amended. Claims 1-21 have been withdrawn from consideration. Claims 30 and 31 are being cancelled herewith.

In the second paragraph on page 3 of the above-identified Office action, claims 22-24 and 29-31 have been rejected as being fully anticipated by Funada et al. (U.S. Patent No. 6,078,299) (hereinafter "Funada") under 35 U.S.C. § 102.

As will be explained below, it is believed that the claims were patentable over the cited art in their original form and as a whole, the claims have, therefore, not been amended to overcome the references. However, in order to facilitate prosecution of the application, claim 22 has been amended to include the subject matter of claims 30 and 31.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 22 calls for, *inter alia*:

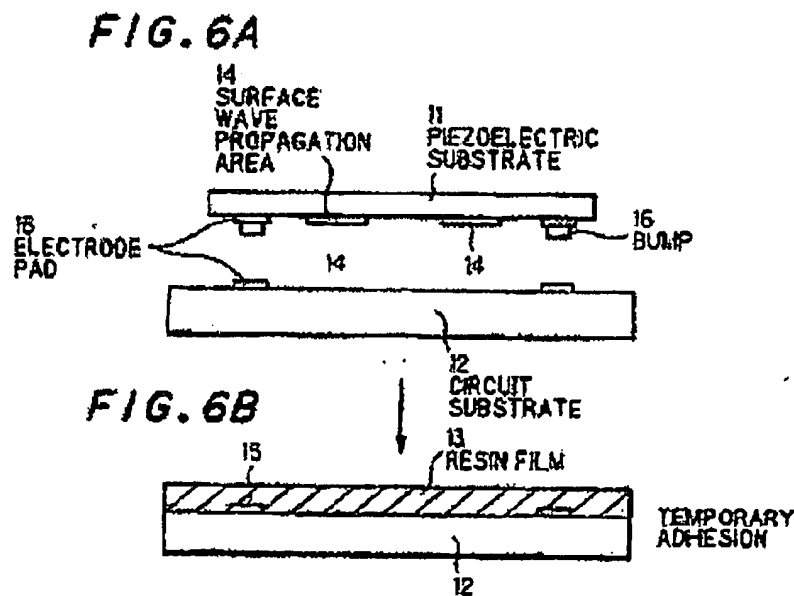
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at least one interconnection for coupling the at least one filter to a wiring substrate using flip-chip technology, the interconnection being a solder or metal bump.

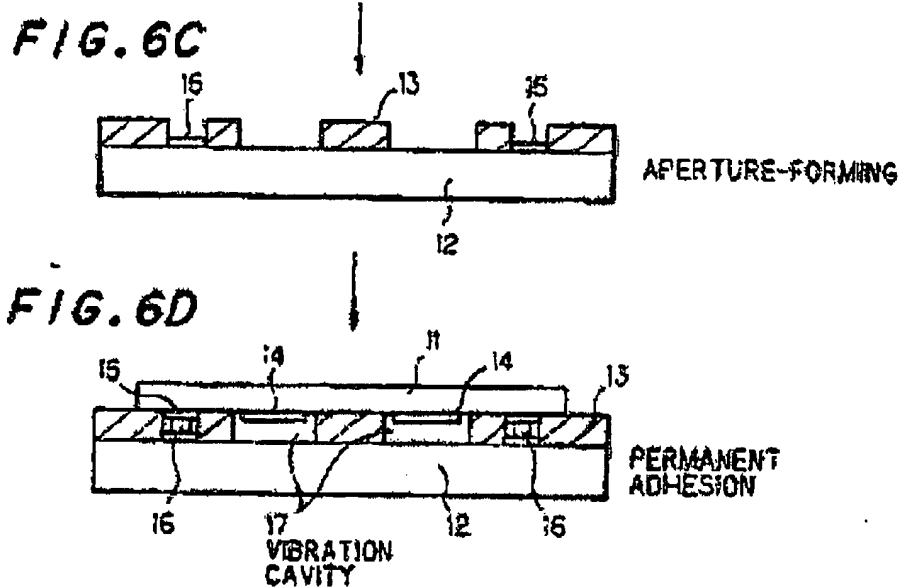
The Funada reference discloses a surface acoustic wave device mounted with a resin film and a method of making the same. As shown in Figs. 6A-6D of Funada, which are provided below, a piezoelectric substrate (11) has a surface wave propagation area (14), electrode pads (15) and bumps (16), and is adhered to the circuit substrate (12). Thereby, cavities (17) are created including the surface wave propagation areas (14), and the bumps of substrate (11) are contacted to the electrode pads (15) of the substrate (12).



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The Examiner refers to Figs. 1-9 and the description in column 4, line 10 to column 8, line 10 to support his view that the interconnection is a solder or metal bump. Applicants respectfully disagree with the Examiner. Applicants cannot find any disclosure in Funada supporting the Examiner's position.

As can be seen from the above given comments, the reference does not show at least one interconnection for coupling the at least one filter to a wiring substrate using flip-chip

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technology, the interconnection being a solder or metal bump, as recited in claim 22 of the instant application.

Since claim 22 is believed to be allowable over Funada, dependent claims 23, 24 and 29 are believed to be allowable over Funada as well.

Furthermore, it is applicants position that claim 22 is not obvious over Funada. There are many flip chip technologies known in the art. For instance, besides solder or metal bumping, stud bumping, adhesive bumping etc. may be named. However, solder or metal bumping is particularly useful in the present application for the following reasons:

1. In contrast to polymer based glue, a metal or solder seal will generate a hermetic cavity. Therefore, there will be no humidity diffusing in and out the cavities. This is an important benefit for the lasting functionality of the filter device.

2. In contrast to polymer based glue, a metal or solder seal allows electrical connections to be made between two bonded wafers.

3. Metal or solder bonding can be done at moderate

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temperature, i.e. at temperatures lower than 300°C. Such temperatures are compatible with the metallization on the device and will not cause any damage to the device. This is contrary to anodic bonding, which is revealed to be not suitable for the production of the BAW, as the required temperatures and process conditions damage the filter devices.

4. Metal or solder bonding allows relatively relaxed flatness tolerances because the seal still works on wafers with a certain degree of flatness problems. In the case of other bonding techniques, such as atomic force bonding, e.g. "Si-fusion bonding", there are challenging problems in dealing with imperfect flatness. Accordingly, the present invention is not restricted to perfectly flat wafers, which provides an overall economic added value of the invention.

In summary, there are many advantages that exist when metal or solder bumping is applied. Neither metal or solder bumping is disclosed in Funada, nor is any motivation provided for a person of ordinary skill in the art to choose metal or solder bumping. Therefore, claim 22 is not obvious over Funada.

In the first paragraph on page 4 of the Office action, claims 22-24 and 29 have been rejected as being fully anticipated by Wright (U.S. Patent No. 6,445,265 B1) under 35 U.S.C. § 102.

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As noted above, claim 22 was amended to include the subject matter of claims 30 and 31. Claims 30 and 31 were not rejected over Wright. Accordingly, claim 22 is allowable over Wright.

In the penultimate paragraph on page 4 of the Office action, claims 25 and 26 have been rejected as being obvious over Funada (U.S. Patent No. 6,078,299) in view of Tanski (U.S. Patent No. 4,409,570) under 35 U.S.C. § 103. Tanski does not make up for the deficiencies of Funada. Since claim 22 is believed to be allowable, dependent claims 25 and 26 are believed to be allowable as well.

In the second paragraph on page 5 of the Office action, claims 25 and 26 have been rejected as being obvious over Wright (U.S. Patent No. 6,445,265 B1) in view of Tanski (U.S. Patent No. 4,409,570) under 35 U.S.C. § 103. Tanski does not make up for the deficiencies of Wright. Since claim 22 is believed to be allowable, dependent claims 25 and 26 are believed to be allowable as well.

In the second paragraph on page 6 of the Office action, claims 30 and 31 have been rejected as being obvious over Wright (U.S. Patent No. 6,445,265 B1) in view of Funada (U.S. Patent No. 6,078,299) under 35 U.S.C. § 103.

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Since claim 22 was amended to include the subject matter of claims 30 and 31. Accordingly, the patentability of claim 22 will be discussed with regard to the rejection over Wright in view of Funada.

Wright discloses a surface acoustic wave device including a thin layer of piezoelectric material, a layer of molecular bonder, and a carrier substrate as shown in Fig. 8b of Wright.

The Examiner correctly states that Wright does not disclose the at least one interconnection for coupling the at least one filter to a wiring substrate using flip-chip technology and wherein the at least one interconnection is a solder or metal bump.

The Examiner then refers to column 5, lines 10-15 of Funada, to support his allegation that Funada discloses a solder or metal bump. Those referred lines read:

"Figs. 6A to 6D show a case where two surface wave propagation areas are formed on a piezoelectric substrate, and a method for fabricating the first SAW device. Fig. 6D shows a cross-sectional view of the first SAW device fabricated in this way. The surface wave propagation areas 14 and electrode pads 15 are formed on the piezoelectric substrate 11."

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Figs. 6A to 6D are shown above. However, applicants respectfully disagree with the Examiner's statement that Funada discloses solder or metal bumps in Figs. 6A to 6D or in the above provided text of Funada.

It is a requirement for a *prima facie* case of obviousness, that the prior art references must teach or suggest all the claim limitations.

As can be seen from the above-given comments, the references do not show or suggest at least one interconnection for coupling the at least one filter to a wiring substrate using flip-chip technology, the interconnection being a solder or metal bump, as recited in claim 22 of the instant application.

The references applied by the Examiner do not teach or suggest all the claim limitations. Therefore, it is believed that the Examiner has not produced a *prima facie* case of obviousness.

In the last paragraph on page 6 of the Office action, claims 27 and 28 have been rejected as being obvious over Funada (U.S. Patent No. 6,078,299) in view of Iwashita et al. (U.S. Patent No. 6,720,846 B2) (hereinafter "Iwashita") under 35 U.S.C. § 103.

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Applicant respectfully believes that Iwashita is not prior art with respect to the instant application. The instant application is a continuation of copending international application PCT/EP01/00554, filed January 18, 2001. Pursuant to 35 U.S.C. § 363, the instant application has a filing date of January 18, 2001, because the instant application designated the United States. This date is fourteen month prior to Iwashita's filing date. Accordingly, Iwashita is unavailable as prior art. Therefore, applicant respectfully submits that the rejection over Funada in view of Iwashita is moot.

In the second paragraph on page 7 of the Office action, claims 27 and 28 have been rejected as being obvious over Wright (U.S. Patent No. 6,445,265 B1) in view of Iwashita (U.S. Patent No. 6,720,846 B2) under 35 U.S.C. § 103. As noted above, the Iwashita reference is not available as prior art. Therefore, applicant respectfully submits that the rejection over Funada in view of Iwashita is moot.

In the first paragraph on page 8 of the Office action, claims 32-34 have been rejected as being obvious over Funada (U.S. Patent No. 6,078,299) in view of Yamada et al. (U.S. Patent No. 5,932,950) (hereinafter "Yamada") under 35 U.S.C. § 103.

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Yamada does not make up for the deficiencies of Funada. Since claim 22 is believed to be allowable, dependent claims 32-34 are believed to be allowable as well.

In the third paragraph on page 8 of the Office action, claims 32-34 have been rejected as being obvious over Wright (U.S. Patent No. 6,445,265 B1) in view of Yamada (U.S. Patent No. 5,932,950) (hereinafter "Yamada") under 35 U.S.C. § 103. Yamada does not make up for the deficiencies of Wright. Since claim 22 is believed to be allowable, dependent claims 32-34 are believed to be allowable as well.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 22. Claim 22 is, therefore, believed to be patentable over the art and since all of the dependent claims are ultimately dependent on claim 22, they are believed to be patentable as well.

In view of the foregoing, reconsideration and allowance of claims 1-29 and 32-34 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel respectfully requests a telephone

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call so that, if possible, patentable language can be worked out.

If an extension of time for this paper is required, petition for extension is herewith made.

Please charge any other fees which might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner & Greenberg P.A., No. 12-1099.

Respectfully submitted,


For Applicant(s)

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